Scientific Excellence • Resource Protection & Conservation • Benefits for Canadians
Excellence scientifique • Protection et conservation des ressources • Bénéfices aux Canadiens

Results of Spiny Dogfish (*Squalus Acanthias*) Tagging in B. C. Waters 1986 - 1989

M. S. Smith, W. T. Andrews, M. W. Saunders,
G. A. McFarlane, and W. Kennedy

Biological Sciences Branch
Department of Fisheries and Oceans
Pacific Biological Station
Nanaimo, British Columbia V9R 5K6

1992

Canadian Data Report of Fisheries and Aquatic Sciences 885

Fisheries and Oceans Pêches et Océans

Canada

Canadian Data Report of Fisheries and Aquatic Sciences

Data reports provide a medium for filing and archiving data compilations where little or no analysis is included. Such compilations commonly will have been prepared in support of other journal publications or reports. The subject matter of data reports reflects the broad interests and policies of the Department of Fisheries and Oceans, namely, fisheries and aquatic sciences.

Data reports are not intended for general distribution and the contents must not be referred to in other publications without prior written authorization from the issuing establishment. The correct citation appears above the abstract of each report. Data reports are abstracted in *Aquatic Sciences and Fisheries Abstracts* and indexed in the Department's annual index to scientific and technical publications.

Numbers 1–25 in this series were issued as Fisheries and Marine Service Data Records. Numbers 26–160 were issued as Department of Fisheries and the Environment, Fisheries and Marine Service Data Reports. The current series name was introduced with the publication of report number 161.

Data reports are produced regionally but are numbered nationally. Requests for individual reports will be filled by the issuing establishment listed on the front cover and title page. Out-of-stock reports will be supplied for a fee by commercial agents.

Rapport statistique canadien des sciences halieutiques et aquatiques

Les rapports statistiques servent à classer et à archiver les compilations de données pour lesquelles il y a peu ou point d'analyse. Ces compilations auront d'ordinaire été préparées à l'appui d'autres publications ou rapports. Les sujets des rapports statistiques reflètent la vaste gamme des intérêts et des politiques du ministère des Pêches et des Océans, c'est-à-dire les sciences halieutiques et aquatiques.

Les rapports statistiques ne sont pas destinés à une vaste distribution et leur contenu ne doit pas être mentionné dans une publication sans autorisation écrite préalable de l'établissement auteur. Le titre exact paraît au-dessus du résumé de chaque rapport. Les rapports statistiques sont résumés dans la revue *Résumés des sciences aquatiques et halieutiques*, et ils sont classés dans l'index annuel des publications scientifiques et techniques du Ministère.

Les numéros 1 à 25 de cette série ont été publiés à titre de relevés statistiques, Services des pêches et de la mer. Les numéros 26 à 160 ont été publiés à titre de rapports statistiques du Service des pêches et de la mer, ministère des Pêches et de l'Environnement. Le nom actuel de la série a été établi lors de la parution du numéro 161.

Les rapports statistiques sont produits à l'échelon régional, mais numérotés à l'échelon national. Les demandes de rapports seront satisfaites par l'établissement auteur dont le nom figure sur la couverture et la page du titre. Les rapports épuisés seront fournis contre rétribution par des agents commerciaux.

Canadian Data Report of
Fisheries and Aquatic Sciences No. 885

1992

RESULTS OF SPINY DOGFISH (*SQUALUS ACANTHIAS*) TAGGING IN B.C. WATERS 1986 TO 1989

by

M. S. Smith, W. T. Andrews, M. W. Saunders, G. A. McFarlane,
and W. Kennedy

Biological Sciences Branch
Department of Fisheries and Oceans
Pacific Biological Station
Nanaimo, British Columbia V9R 5K6

(c) Minister of Supply and Services Canada 1992
Cat. No. Fs 97-13/885E ISSN 0706-6465

Correct citation for this publication:

Smith, M. S., W. T. Andrews, M. W. Saunders, G. A. McFarlane, and W. Kennedy. 1992. Results of spiny dogfish (Squalus acanthias) tagging in B.C. waters 1986 to 1989. Can. Data Rep. Fish. Aquat. Sci. 885: 130 p.

93-02799/

ABSTRACT

Smith, M. S., W. T. Andrews, M. W. Saunders, G. A. McFarlane, and W. Kennedy. 1992. Results of spiny dogfish (Squalus acanthias) tagging in B.C. waters 1986 to 1989. Can. Data Rep. Fish. Aquat. Sci. 885: 130 p.

During 1987 and 1988, 10,716 spiny dogfish were tagged in British Columbia waters, 6186 in the Strait of Georgia, 894 off southwest Vancouver Island and 3636 in southeastern Queen Charlotte Sound. A total of 69,865 spiny dogfish have been tagged in British Columbia waters since 1978. As of December 31, 1989, 2621 have been recovered from all releases. Preliminary information on recoveries (2232) from Strait of Georgia releases indicates that 1749 (78%) were recaptured in the Strait of Georgia, 48 (2%) moved north of the Strait of Georgia, 74 (4%) moved south into Puget Sound and Juan de Fuca Strait and 78 (3.5%) moved into outer coastal areas of Vancouver Island and Washington. In addition, 238 fish have been recovered from southwest Vancouver Island releases and 151 fish have been recovered from north coast releases.

RÉSUMÉ

Smith, M. S., W. T. Andrews, M. W. Saunders, G. A. McFarlane, and W. Kennedy. 1992. Results of spiny dogfish (Squalus acanthias) tagging in B.C. waters 1986 to 1989. Can. Data Rep. Fish. Aquat. Sci. 885: 130 p.

En 1987 et 1988, on a étiqueté 10 716 aiguillats communs dans les eaux de Colombie-Britannique : 6 186 dans le détroit de Géorgie, 894 au sud-ouest de l'île de Vancouver et 3 636 dans le sud-est du bassin de la Reine-Charlotte. Au total, 69 865 aiguillats communs ont été marqués depuis 1978 dans les eaux de la province. Au 31 décembre 1989, on avait récupéré 2 621 des poissons marqués. Les données préliminaires sur les récupérations d'aiguillats (2 232) marqués dans le détroit de Géorgie indiquent que 1 749 poissons (78 %) ont été repris dans le détroit, 48 (2 %) sont sortis du détroit par le nord, 74 (4 %) se sont retrouvés au sud, dans le Puget Sound et le détroit de Juan de Fuca, et 78 (3,5 %) se sont déplacés plus au large devant les côtes de l'île de Vancouver et de l'État de Washington. En outre, on a repris 238 aiguillats marqués au sud-ouest de l'île de Vancouver, et 151 marqués sur la côte nord.

INTRODUCTION

This is the seventh report describing the results of the spiny dogfish (Squalus acanthias) tagging program. This report is similar in format to previous reports (Brown et al. 1979; Beamish et al. 1981; McFarlane et al. 1982; Smith et al. 1983; Saunders et al. 1985; Smith et al.1989), and presents release information for taggings conducted during 1987 and 1988 (Table 1), and recovery information to December 31, 1989. Individual fish recovery information is not included.

The primary purpose of the program is to examine the movement of dogfish throughout British Columbia waters.

MATERIALS AND METHODS

A total of five dogfish tagging cruises were conducted during 1987 and 1988 (Table 1). Dogfish were tagged in the Campbell River area in May-June of 1987 and 1988 by students and staff of the Campbell River School district on board the chartered fishing vessel "INVADER NO.1". Pacific Biological Station staff conducted other operations during January 1987 in the southeastern Queen Charlotte Sound area aboard the chartered fishing vessel OCEAN ROAMER; during February 1987 off the southwest coast of Vancouver Island aboard the research vessel W.E. RICKER and during June 1988 off Qualicum Bay in the central section of the Strait of Georgia, aboard the chartered fishing vessel VIVID.

Longline gear was used during all cruises in the Strait of Georgia and in the southeast Queen Charlotte Sound area. The longline gear consisted of Mustad 12/0 stainless steel halibut hooks (quality 9401) with the barbs bent over, fastened to a braided nylon gangion 55 cm long. All hooks were baited with frozen herring and attached to the the groundline with snaps every 2 or 3 m as the line was set over the stern of vessel. The line was retrieved after a suitable soak time. Soak time was defined as the time of the first hook overboard and time of the first hook retreived.

A highlift Engel bottom trawl with a light groundline was used on board the R/V W.E. RICKER. Records were maintained of all pertinent set and recovery information.

After capture all fish were placed in live tanks with continuously flowing sea water. Fish were removed from the live tanks and anaesthetized in a smaller tank containing 150 L of seawater and 25 mg of tricaine methane sulphonate (MS 222). When the fish appeared lethargic they were removed from the anaesthetic, measured, sexed, tagged and released. All fish were measured for total length, described as the distance measured between the tip of the snout and the tip of the upper lobe of the caudal fin when it is directed downward in a straight line with the body. Records were kept of area of capture and release as well as general condition of the fish, small injuries and problems with the tag. On board the R/V W.E. RICKER, fish were held up to one hour after tagging in live tanks prior to release.

Most fish were tagged with a modified Petersen disc (McFarlane and Beamish 1986). A new flexible modified Petersen disc was introduced to the tagging program in the Campbell River area during May-June 1988 (Table 1). This tag is approximately the same size as the modified Petersen disc, but constructed of a single layer of soft plastic material. All fish were tagged using the same procedure described previously (Brown et al.1979; Beamish et al.1981; McFarlane et al. 1982)

A recovery was considered usable when the whole tagged fish or the tags alone were received. For all recoveries, information regarding location, fishing method, fishing depth and date of recapture, along with the fisherman's name, address and telephone number were recorded. Specific recovery location was recorded as 'unknown' for processing plant recoveries where accurate information was not available.

When whole tagged fish were recovered additional information was recorded including recapture length, sex, condition of the tags and severity of the tag wound. The first dorsal fin spine was removed complete with the applied tag and frozen. The second dorsal fin spine was also removed for ageing. If the tagged fish was injected with OTC at release, the second dorsal spine was examined under an ultra violet lamp to determine if a mark was present and if so, the quality of the OTC mark was noted.

Prior to 1989 reward of ($3.00) was paid for the return of the tags only, and because the second dorsal spine is required for age determination studies a higher reward ($5.00) was paid for the return of whole tagged dogfish. During 1989 incentives to return tags and whole dogfish with tags were increased to ($5.00) for the return of either the tag or whole fish. The reporter has his choice of either a monetary reward or a tag

recapture ball cap with a distinctive crest designed especially for this progam.

Titanium pins from tags that had been at large 7, 9 and 10 years respectively were forwarded to the Defense Research Establishment at Victoria for examinination of corrosion using scanning electron microscopy.

RESULTS AND DISCUSSION

RELEASES

A total of 10,716 dogfish were tagged and released during 1987 and 1988 (Table 1). A reference map of release place names is presented in Figure 1. Summary set location and capture data are presented in Table 2 for southeast Queen Charlotte Sound, January 1987, in Tables 3 and 4 for the Campbell River area taggings, during 1987 and 1988 respectively, and in Table 5 for Qualicum Bay area in 1988. Set location and capture data for the R/V W.E. RICKER cruise is included in Appendix table 1. Catch information by cruise and set is available in Appendix tables 2 to 5. Release data by set including numbers of males and females released, release location, and tag series numbers are presented for all cruises in Tables 6 to 10. Summaries of incidental species caught during the cruises are listed in Tables 11 and 12.

Lists of common and scientific names of fishes encountered during these tagging cruises are included in Table 13. Summaries of length frequencies of fish released by cruise are presented in Table 14. Detailed information of length frequencies of released fish by cruise and set are included in Appendix tables 6 to 10.

In January 1987 a tagging experiment was conducted in the southeastern sections of Queen Charlotte Sound. During this cruise 22 longline sets (18,744 hooks; range 400 to 1,055) were completed. Duration of the "soak" ranged from 78 to 772 minutes per set (overnight) and depths ranged from 97 to 196 metres. Three thousand eight hundred and twenty-five spiny dogfish were captured (Table 2). A total of 3,636 fish were tagged, including 1101 in the Pine Island area, 1,679 off Egg Island, 61 in Smith Sound, 683 in the entrance of Rivers Inlet, 104 in Cormorant Channel and 197 in Blackfish Sound (Table 6). Females

predominated (60%) ranging in size from 51 cm to 125 cm with modes at 100 cm and 91 cm while males ranged in size from 52 cm to 105 cm with a mode at 85 cm. (Table 14; Appendix table 6).

In May-June 1987 fishing effort was directed in the Campbell River area where 27 longline sets (10,603 hooks; range 306 to 411 hooks per set) were completed. Soak time ranged from 45 to 95 minutes and depths ranged from 27 to 146 metres. Two thousand nine hundred and eighty-seven spiny dogfish were captured (Table 3). A total of 2,570 fish were tagged in the Cape Mudge - Francisco Point area and 272 fish were tagged south of Marina Island (Table 7). Males predominated (78%) ranging in size from 44 cm to 97 cm with a mode at 80 cm. Females ranged in size from 46 cm to 117 cm with a mode at 100 cm. (Table 14; Appendix table 7).

In May-June 1988 fishing effort was also directed at the Campbell River area where 27 longline sets (8,135 hooks; range 287 to 315 hooks per set) were completed. Soak time ranged from 35 to 130 minutes and depths ranged 18 to 170 metres. A total of 2,646 spiny dogfish were captured (Table 4). Most dogfish (2,464 fish) were tagged in the Cape Mudge area and 48 fish were tagged off Shelter Point 3 mi. S. of Cape Mudge (Table 8). Once again males predominated (85%) ranging in size from 42 cm to 99 cm with modes at 83 cm and 64 cm. Females ranged in size from 42 cm to 121 cm with modes at 102 cm and 97 cm. (Table 14; Appendix table 8). During this cruise 1,197 fish (46%) had the flexible modified Petersen disc applied.

During June 1988, as part of a dogfish predation study 880 dogfish were tagged off Qualicum Bay near the location of a major salmon hatchery. Thirty-six sets (approximately 10,750 hooks; range 250 to 300 hooks per set) were completed. Soak times ranged from 12 to 68 minutes and depths ranged from 13 to 77 metres. A total of 884 dogfish were captured (Table 5). Slightly more males (55%) were tagged than females (Table 9). Males (480 fish) ranged in size from 49 cm to 99 cm with a modal size of 80 cm. Females (400 fish) ranged in size from 49 cm to 119 cm with a modal size of 73 cm (Table 14; Appendix table 9).

During February 1987, a total of 17 trawl hauls were completed aboard the R/V W.E. RICKER off the southwest coast of Vancouver Island. Trawl hauls ranged from 19 to 43 minutes in duration and 48 to 152 metres in depth (Appendix table 1). A total of 894 dogfish were tagged (Table 10). Once again males predominated 66.5% (595 fish) and ranged in size from 55 cm to 97 cm with a mode at 85 cm. Females (298 fish) ranged in size from 53 cm to 119 cm with modes at 103 cm and 65 cm. (Table 14; Appendix table 10).

RECAPTURES 1978 - 1989

A total of 69,865 spiny dogfish have been tagged and released since 1978 (Table 1), 9,377 in north coast waters which include Dixon Entrance, Hecate Strait, Queen Charlotte Sound and Queen Charlotte Strait; 9,915 off southwest Vancouver Island and 50,574 in the Strait of Georgia. As of December 31, 1989, a total of 2,621 (3.8%) tagged fish have been recovered; 151 (1.6%) of north coast, 238 (2.4%) of the southwest Vancouver Island, and 2,232 (4.4%) of the Strait of Georgia releases (Tables 16). Recaptures have been made throughout the north Pacific Rim. Recovery locations by area of release are presented in Table 15.

RECAPTURES FROM STRAIT OF GEORGIA RELEASES

As of December 31, 1989 a total of 2232 (4.4%) tagged dogfish were recovered from Strait of Georgia releases (Tables 15 and 16). Most of the fish (1,749; 78%) were recovered in the Strait of Georgia and 1,049 (47%) were recovered in the same section as their release. Few fish were recovered north of the Strait of Georgia; 27 (1.2%) from Johnstone Strait and 20 (0.9%) from Queen Charlotte Sound and Hecate Strait. To the south; 32 (1.4%) and 47 (2.1%) were recovered from Puget Sound and Strait of Juan de Fuca respectively. A further 48 (2.2%) and 29 (1.3%) were recovered from the outer coastal area of Vancouver Island and Washington State, single recoveries were made from Oregon and Alaska. A further, 409 (18%) Strait of Georgia tag recoveries were listed as either unknown Strait of Georgia (131, 5.8%), unknown Canadian (169, 7.5%) or unknown (109; 4.9%) (Table 15).

RECAPTURES FROM SOUTHWEST COAST VANCOUVER ISLAND RELEASES

As of December 31, 1989, a total of 238 (2.4%) tagged dogfish have been recovered from south west coast of Vancouver Island releases (Table 15 and 16). Most of the fish (100; 42%) were recovered in the area of release. Four fish were recovered north of the tagging area including 1 from Alaska and 4 from Hecate Strait and 27 were recovered south of the tagging area including 15 (6.3%) from off Washington, 8 (3.4%) from Oregon and 4 (1.7%) from California. Thirty-five fish were recovered from inner coastal locations including 19 (17.5%) from the Strait of Georgia, 7 (2.9%) from Puget Sound and 9 (3.8%) from Strait of

Juan de Fuca. Four fish were recovered from Japan and one from Mexico. A further 68 (29%) were listed as either unknown Canadian (30, 12.6%) or unknown (37, 15.5%).

RECAPTURES FROM NORTH COAST OF BRITISH COLUMIBA RELEASES

As of December 31, 1989 a total 151 (1.6%) tagged dogfish were recovered from north coast releases (Tables 15 and 16). Thirty-nine (26%) tagged fish were recovered in Hecate Strait, 30 (20%) off the west coast of Vancouver Island and 14 (9%) from Queen Charlotte Sound. Other recoveries include 1 from Alaska, 1 from the west coast of the Queen Charlotte Islands, 1 from Johnson Strait, 12 (8%) from the Strait of Georgia, 2 from Puget Sound, 3 from the Strait of Juan de Fuca; 4 (3%) from offshore Washington and 2 from Oregon. Eight fish were recovered from Japan and one from California. A further 36 (23.8%) were listed as either unknown Canadian (18, 11.9%) or unknown (15, 9.9%).

RECOVERY METHODS

Tagged dogfish were recaptured in all types of fisheries (Table 17). Directed fisheries for dogfish recaptured most (56%) of the tagged fish; bottom fish trawl 773 (29%) fish, longline 605 (23%) fish, sunken gillnet 94 (4%) fish and prawn bait 17 (1%) fish. Other fisheries that recaptured tagged fish included sports (troll and bait) 340 (13%)fish, commercial salmon (gillnet,troll and seine) 203 (8%) fish, hake midwater 45 (2%) fish, handline (rockfish and lingcod) 45 (2%) fish, shrimp bottom trawl 14 (0.5%) fish, halibut longline 12 (0.5%)fish, and trap (crab and sablefish) 9 (0.4%) fish. A further 449 (18%) had no information on recovery method.

Samples of the titanium pins from 3 different releases that were at large 7, 9 and 10 years respectively, showed no signs of corrosion.

ACKNOWLEDGEMENTS

This study continues to provide specific information that assists in ecological studies, stock assessment and the development of management strategies for spiny dogfish. It has allowed high school students to participate in the execution of a practical biological research project. In part, the success of this study is a direct result of the of the participation and enthusiasm of Campbell River Senior Secondary and Southgate Secondary schools. Bill Kennedy coordinated teachers and student teams from the two schools. Chrys Neville of the Pacific Biological Station coordinated tagging crews in the Qualicum Bay area. Thanks are extended to Captain Hugh Watson of the M/V INVADER NO 1, Captain John Wilkes, and crew of the M/V VIVID and Captain Bruce Whittaker and crew of the M/V OCEAN ROAMER. Jim Moores of Defense Research Establishment Pacific (DNP) at Victoria completed examination of the titanium pins.

We thank fishermen throughout the Pacific Rim including Canada, U.S.A., Japan and Mexico and the state and federal agencies of those nations that assisted the fishermen, in forwarding the tags with information.

REFERENCES

Beamish, R. J., M. S. Smith, L. G. Egan, D. Brown, and G. A. McFarlane. 1981. Results of spiny dogfish (Squalus acanthias) tagging in the Strait of Georgia in 1979. Can. Data Rep. Fish. Aquat. Sci. 262: 73 p.

Brown, D. R., L. G. (Van) Egan, M. S. Smith, and R. J. Beamish. 1979. Results of spiny dogfish (Squalus acanthias) tagging in the Strait of Georgia in 1978. Fish. Mar. Serv. Data Rep. 141: 32 p.

McFarlane, G. A., and R. J. Beamish. 1986. A tag suitable for assessing longterm movements of spiny dogfish (Squalus acanthias) and preliminary results of this tag. N. Am. J. Fish. Manage. 6: 69-76.

McFarlane, G. A., and R. J. Beamish. 1987. Validation of the dorsal spine method of age determination for spiny dogfish. pp. 287-300 In R. C. Summerfelt and G. E. Hall [eds.] Age and growth of fish. Iowa State University Press. 544 p.

McFarlane, G. A., R. J. Beamish, M. S. Smith, L. G. (Van) Egan, and D. Brown. 1982. Results of spiny dogfish tagging in the Strait of Georgia, Queen Charlotte Sound, Hecate Strait and Dixon Entrance during 1980. Can. Manuscr. Rep. Fish. Aqat. 1646: 123 p.

Saunders, M. W., G. A. McFarlane, and M. S. Smith. 1985. Results of spiny dogfish (Squalus acanthias) tagging in B.C. waters during 1982 and 1983. Can. Data Rep. Fish. Aquat. Sci. 515: 228 p.

Smith, M. S., G. A. McFarlane, and L. G. (Van) Egan. 1983. Results of spiny dogfish (Squalus acanthias) tagging in the Strait of Georgia during 1981. Can. Data Rep. Fish. Aquat. Sci. 424: 95 p.

Smith, M. S., M. W. Saunders. G. A. McFarlane, and L. G. (Van) Egan. 1989. Results of spiny dogfish (Squalus acanthias) in B.C. waters during 1984 and 1985. Can. Data Rep. Fish. Aquat. Sci. 778: 213 p.

Table 1. Summary of spiny dogfish tag releases and OTC injections 1978 to 1988.

Cruise	Numbers tagged M	F	U*	T	OTC injections Inter-muscular	Intra-peritoneal	Control	Series numbers	Area
April-June 1978	624	1294		1918		no injections		DF41000-42599 DF42800-42899	Northern Strait of Georgia
April-May 1979	1656	1516		3172		no injections		DF42600-42799 DF42900-46299 Modified Peterson Disc	Northern Strait of Georgia
November 1979	551	777	1	1329		no injections		DF59000-60338	Southern and Central Strait of Georia
February 1980	1245	306	1	1522		no injections		DF60367-61928	Southern Strait of Georgia
March 1980	2393	807	2	3202		no injections		DF61929-65156	Southern Strait of Georgia
April-May 1980	1754	967		2721	1460	0	1261	DF65200-65999 DF137000-138942	Northern Strait of Georgia
June-July 1980	274	789	1	1064		no injections		Peterson Discs. DF46300-46810 Modified Petersen Disc DF138892-139499	Dixon Entrance, Hecate Strait and Queen Charlotte Sound
April-May 1981	2733	662		3395		no injections		DF157000-160482 DF160500-160530	Northern Strait of Georgia
November 1981	1212	2359	4	3575	2718	854	2	DF160484-160499 DF160531-161999 DF8242000-8244173	Southern and Central Strait of Georgia
March 1982	2281	711	9	3001	1492	758	751	DF8244174-8247205	Central Strait of Georgia
April-May 1982	2517	1019		3536	2793	0	743	DF8247206-8250761	Northern Strait of Georgia
June-July 1982	3312	652	1	2965	1934	1004	1027	DF8250763-8254821	Southern and Central Strait of Georgia
July-Aug. 1982	1227	586		813		no injections		DF8258000-8258821	Dixon Entrance and Hecate Strait
Sept.-Oct. 1982	1266	2596	2	3864		no injections		DF8258827-8262940	Hecate Strait
May 1983	991	622		1613	812	0	801	DF8254882-8256389	Northern Strait of Georgia

Table 1 (cont'd)

Cruise	Numbers tagged M	F	U*	T	OTC injections Inter-muscular	Intra-peritoneal	Control	Series numbers	Area
March 1984	1533	1733	11	3277	no injections			DF8256390-8256399 DF8256642-8257999 DF8262837-8262899 DF8262941-8264634	Southern and Central Strait of Georgia
May 1984	1185	783		1978	no injections			DF8307000-8308966	Southwestern Vancouver Island
May-June 1984	3023	995	1	4019	1952	0	2066	DF8264700-8266999 DF8314000-8314666 DF8315000-8315999	Northern Strait of Georgia
February 1985	76	980	1	1057	no injections			DF8308967-8308999 DF8309100-8310083 DF8310143-8310152	Southwestern Vancouver Island
May 1985	2924	1188	1	4113	2027	0	2086	DF8312000-8313999 DF8314667-8314699 DF8314763-8314999 DF8316000-8316999	Northern Strait of Georgia
July 1985	3023	2956	7	5986	no injections			DF8310200-8311099 DF833200-8337162	Southwestern Vancouver Island
January 1987	1382	2249	5	3636	no injections			DF8352000-8355768	Southwestern Queen Charlotte Sound
February 1987	595	298	1	894	no injections			DF8337163-8338062	Southwestern Vancouver Island
May-June 1987	2213	591	38	2842	no injections			DF8310156-8310199 DF8311844-8311899 DF8311975-8311999 DF8338070-8340773 DF8340800-8340859	Northern Strait of Georgia
May-June 1988	2093	367	4	2464	no injections			DF8340774-8340799 DF8340860-8341399 DF8355773-8356452 DF8357000-8357042 Flexible Modified Petersen Disc DF8367000-8357042	Northern Strait of Georgia
June 1988	480	400		880	no injections			Modified Petersen Disc DF8356453-8356999 DF8357043-8357315 DF8357600-8357666	Central Strait of Georgia
Totals	41,563	28,213	89	69,866					

*u=unsexed

Table 2. Set location and catch data for the M/V Ocean Roamer spiny dogfish tagging cruise in the southeastern Queen Charlotte Sound during January 1987.

Set No.	Date	Area	Depth (m)	Time set PST	Soak time (min)	No. of Hooks	No. of dogfish	No. of incidental catch
1	January 14	Pine Island	149	0730	99	840	299	8
2	14	" "	156	1146	124	840	261	4
3	January 15	" "	155	0855	125	1055	90	25
4	January 16	" "	154	0732	103	948	153	15
5	16	" "	196	1147	98	940	38	39
6	16	" "	158	1532	86	775	67	54
7	January 17	Egg Island	137	0747	86	946	384	13
8	January 18	" "	141	0748	104	772	179	45
9	18	" "	135	1229	113	740	329	10
10	18	" "	132	1655	95	740	265	6
11	January 19	" "	106	0756	104	971	200	5
12	19	" "	129	1151	135	971	295	4
13	January 20	Pine Island	147	0811	128	892	52	16
14	20	" "	152	1244	100	892	107	33
15	20	" "	121	1716	78	400	36	4
16	January 21	Egg Island	129	0744	118	957	85	8
17	21	Rivers Inlet	97	1315	102	850	263	14
18	21	" "	105	1730	180	850	178	21
19	January 22	" "	110	0801	131	805	241	4
20	22	Smith Sound	118	1429	127	700	61	15
21	January 23	Cormorant Channel	108	1723	772	930	104	13
22	January 24	Blackfish Sound	162	0906	140	930	198	13
					Totals	18,744	3,885	369

Table 3. Set location and catch data for the Campbell River area, spiny dogfish tagging cruise, during May - June 1987.

Set No.	Date	Area	Depth (m)	Time set PDT	Soak time (min)	No. of hooks	No. of dogfish	No. of incidental catch
1	May 6	Cape Mudge	108	0845	60	308	94	3
2	6	" "	136	1110	95	306	48	2
3	May 7	" "	96	0845	70	400	122	9
4	7	" "	102	1140	80	400	105	11
5	May 8	" "	128	0905	65	402	157	2
6	8	" "	104	1210	75	389	143	10
7	May 12	" "	27	0905	67	395	13	8
8	12	" "	116	1145	50	403	135	6
9	May 14	" "	114	0910	70	400	160	5
10	May 15	" "	144	0910	65	400	122	3
11	15	" "	122	1150	50	400	91	27
12	May 19	" "	105	0835	85	400	113	1
13	19	" "	101	1145	65	398	117	12
14	May 20	Marinals	40	0900	40	411	75	0
15	20	" "	27	1120	50	381	72	2
16	May 22	" "	-	0934	60	400	61	13
17	22	" "	-	1145	65	400	78	2
18	May 25	Cape Mudge	-	0900	60	400	150	2
19	25	" "	-	1145	60	400	159	1
20	May 26	" "	59	0905	60	397	192	1
21	26	" "	46	1215	45	405	222	5
22	June 01	" "	95	0900	65	400	106	0
23	June 01	Cape Mudge	146	1215	65	400	84	0
24	June 02	" "	-	0830	75	408	95	5
25	02	" "	-	1115	70	400	146	2
26	June 03	" "	-	0845	65	400	39	3
27	03	" "	-	1200	75	400	88	4
					Totals	10,603	2,987	139

Table 4. Set location and catch data for the Campbell River area, spiny dogfish tagging cruise, during May - June 1988.

Set No.	Date	Area	Depth (m)	Time set PDT	Soak time (min)	No. of hooks	No. of dogfish	No. of incidental catch
1	May 4	Cape Mudge	90	0910	60	300	93	5
2	4	" "	137	1115	65	300	94	5
3	4	" "	115	1330	45	311	107	4
4	May 5	" "	92	0820	70	300	123	5
5	5	" "	101	1045	75	296	59	13
6	5	" "	119	1300	75	300	137	1
7	May 9	" "	101	0815	65	315	196	1
8	9	" "	124	1055	70	300	139	2
9	9	" "	101	1310	60	305	109	1
10	May 11	" "	101	0820	60	300	56	2
11	11	" "	101	1040	65	300	77	13
12	11	" "	119	1250	60	295	95	7
13	May 12	" "	18	0830	75	303	51	40
14	12	" "	128	1049	61	306	101	7
15	12	" "	128	1300	130	297	100	2
16	May 16	" "	101	0850	55	300	91	2
17	May 17	" "	146	0910	50	300	100	5
18	May 19	" "	110	0815	60	309	118	0
19	19	" "	152	1045	65	298	71	4
20	May 20	Shelter Point	119	0825	60	290	53	1
21	20	Cape Mudge	143	1045	55	313	81	6
22	20	" "	170	1300	65	300	106	1
23	May 25	" "	128	0920	40	306	86	1
24	25	" "	102	1115	55	304	105	6
25	May 30	" "	110	0842	58	287	86	1
26	June 01	" "	110	0830	55	300	113	0
27	01	" "	106	1055	35	300	99	0
					Totals	8,135	2,646	136

Table 5. Set location and catch data for the Qualicum Bay spiny dogfish cruise, during June 1988.

Set No.	Date	Area	Depth (m)	Time set PDT	Soak time (min)	No. of hooks	No. of dogfish	No. of incidental catch
1	June 13	Qualicum Bay	13	0815	50	300	43	7
2	13	" "	60	0955	44	300	61	-
3	13	" "	30	1125	61	300	30	*
4	13	" "	73	1310	30	300	62	
5	13	" "	16	1438	12	300	40	1
6	June 14	" "	16	1550	28	300	35	1
7	14	" "	12	0816	29	300	15	4
8	14	" "	21	0827	31	300	17	8
9	14	" "	77	1042	30	300	38	-
10	14	" "	20	1157	63	300	27	-
11	14	" "	13	1330	29	300	21	1
12	14	" "	72	1442	34	300	27	-
13	June 15	" "	15	0842	26	300	13	5
14	15	" "	39	0945	27	300	22	1
15	15	" "	66	1052	26	300	31	-
16	15	" "	31	1159	53	300	22	19
17	15	" "	37	1320	32	300	10	1
18	15	" "	70	1428	25	300	12	1
19	15	" "	59	1530	34	300	31	1
20	June 16	" "	42	0832	27	300	11	5
21	16	" "	48	0931	26	300	21	1
22	16	" "	74	1033	28	300	29	1
23	16	" "	69	1135	62	300	43	1
24	16	" "	68	1310	27	300	17	2
25	16	" "	15	1422	26	300	12	8*
26	16	" "	41	1524	28	300	9	9
27	June 17	" "	15	0845	30	300	25	4
28	17	" "	40	1009	27	300	17	-
29	17	" "	77	1122	26	300	17	

Table 5 (cont'd)

Set No.	Date	Area	Depth (m)	Time set PST	Soak time (min)	No. of hooks	No. of dogfish	No. of incidental catch
30	June 17	Qualicum Bay	70	1242	53	300	27	2
31	17	" "	64	1422	38	300	27	1
32	17	" "	13	1605	60	300	25	2
33	June 18	" "	16	0830	35	300	7	15
34	18	" "	32	0956	46	250	7	8
35	18	" "	67	1120	49	300	15	2
36	18	" "	43	1250	58	300	16	3
					Totals	10,750	884	112

Table 6. Number and tag identification of spiny dogfish released in the southeastern Queen Charlotte Sound area, by set, during January 1987.

Set no.	Release location	No. released			Tag no. range	Cumulative release total
		M	F	T[a]	DF 83	
1	Pine Island	115	172	287	52000-52288	287
2	" "	42	208	250	52289-52541	627
3	" "	57	29	86	52542-52631	623
4	" "	123	27	150	52632-52782	773
5	" "	9	29	66	52783-52821	811
6	" "	37	29	66	52822-52887	877
7	Egg Island/Smith Sound	150	138	289	52888-53179	1166
8	Egg Island	50	123	173	53180-53352	1339
9	" "	196	112	308	53353-53664	1648
10	" "	99	160	259	53665-53925	1906
11	" "	49	142	192[a]	53926-54126	2098
12	" "	53	221	274	54127-54401	2372
13	Pine Island	18	32	50	54402-54451	2422
14	" "	43	61	104	54452-54555	2526
15	Storm Islands	7	27	34	54556-54589	2560
16	Egg Island	33	34	68[a]	54590-54657	2628
17	Rivers Inlet	9	253	263[a]	54658-54921	2891
18	" "	32	143	175	54922-55097	3066
19	" "	71	169	240	55098-55439	3306
20	Smith Sound	34	27	61	55440-55501	3367
21	Mitchell Bay/ Cormorant Channel	14	62	76	55502-55577	3443
22	Blackfish Sound	141	51	192	55578-55768	3636
	Totals	1382	2249	3636[a]		

[a]Includes fish released with incomplete information.

Table 7. Number and tag indentification of spiny dogfish released in the Campbell River area, by set, during May-June 1987.

Set no.	Release location	No. released			Tag range D83-----	Cumulative release total
		M	F	T[b]		
1	Cape Mudge	83	4	88[a]	10156-10199 11884-11899 11975-11999 38070-38073	88
2	" "	38	6	44	38074-38095	132
3	" "	94	26	120	38096-38156 38222-38283	252
4	" "	91	12	104[a]	38157-38199 38285-38332 38400-38411	356
5	" "	124	27	151	38333-38399 38412-38490 38600-38604	507
6	" "	108	22	130	38491-38556 38605-38668	637
7	" "	10	3	13	38557-38563 38669-38673	650
8	" "	124	8	132	38564-38599 38674-38737 38800-38832	782
9	" "	138	5	143	38738-38799 38833-38908 39000-39004	925
10	" "	78	29	108[a]	38908-38962 39005-39059	1033
11	" "	81	9	90	38963-38999 39063-39106 39200-39205	1123
12	" "	82	27	109	39107-39156 39206-39266	1232
13	" "	101	11	112	39157-39199 39267-39331 39400-39405	1344
14	Marina Is.	14	57	71	39332-39369 39406-39439	1415
15	"	11	54	66[a]	39370-39399 39440-39475	1481
16	"	8	52	60	39476-39503 39600-39631	1541

Table 7 (cont.)

Set no.	Release location	No. released			Tag range D83-----	Cumulative release total
		M	F	T[a]		
17	"	25	9	75[a]	39504-39538 39632-39671	1616
18	Cape Mudge	121	26	147	39539-39599 39672-39699 40100-40143 40200-40214	1763
19	" "	94	30	154[a]	40144-40199 40215-40287 40300-40324	1917
20	" "	162	23	185	39700-39777 39800-39894 40287-40299	2102
21	" "	188	22	210	39778-39799 39895-39999 40000-40082	2312
22	" "	86	14	101[a]	40083-40099 40325[c]-40367 40400-40437	2413
23	" "	50	24	75	40368-40399 40438-40480	2488
24	" "	74	19	93	40500-40544 40600-40647	2581
25	" "	129	10	140[a]	40481-40499 40545-40599 40648-40713	2721
26	" "	31	8	39	40714-40731 40800-40820	2760
27	" "	68	14	82	40732-40773 40821-40860	2842
	Totals	2213	591	2842[a]		

[a]Total includes fish released with incomplete information

Table 8. Numbers and tag identification of spiny dogfish released in Campell River area, by set, during May - June 1988.

Set no.	Release location	No. released			Tag no. range Modified Petersen DF.83--------	Tag no. range Flexible mod. Petersen DF.83--------	Cumulative release total
		M	F	T[a]			
1	Cape Mudge	70	21	91	40774 - 40799 40860 - 40918 41100 - 41105		91
2	" "	69	18	87	40919 - 40963 41106 - 41148		178
3	" "	81	1	82	40964 - 40999 41149 - 41178 41200 - 41215		260
4	" "	103	13	117[a]		67000 - 67056 67100 - 67159	377
5	" "	50	6	56		67057 - 67084 67160 - 67189	433
6	" "	119	4	125[a]	41179 - 41199 41216 - 41239	67085 - 67099 67196 - 67254	558
7	" "	156	33	189	41240 - 41348	67255 - 67345	747
8	" "	112	18	130	41340 - 41399	67346 - 67415	877
9	" "	96	10	106	55900 - 55967	67420 - 67468	983
10	" "	136	14	151[a]	55968 - 55999 55773 - 55822	67469 - 67538	134
11	" "	58	13	71	55823 - 55859	67539 - 67572	1205
12	" "	75	9	84	55860 - 55893	67573 - 67623	1289
13	" "	35	15	50	55894 - 55899 56000 - 56018	67624 - 67648	1339
14	" "	62	36	98	56019 - 56065	67649 - 67699	1438
15	" "	72	5	77	56066 - 56102	67700 - 67739	1514
16	" "	72	9	81	56103 - 56142	67740 - 67780	1595

Table 8 (cont'd)

Set no.	Release location	No. released M	F	T[a]	Tag no. range Modified Petersen DF.83--------	Tag no. range Flexible mod. Petersen DF.83--------	Cumulative release total
17	" "	67	22	89	56143 - 56172	67781 - 67799 68100 - 68139	1684
18	" "	92	14	106	41000 - 41046	68140 - 68198	1790
19	" "	45	17	62	41047 - 41071	68199, 67800 - 67835	1852
20	Shelter Point	44	4	48	41072 - 41096 56173 - 56195	67836 - 67874	1900
21	Cape Mudge	54	13	67	41097 - 41099 56196 - 56220		1967
22	" "	56	25	81	56221 - 56260	67875 - 67916	2048
23	" "	74	5	79	56261 - 56292	67917 - 67963	2127
24	" "	55	10	65	56293 - 56322	67964 - 67999	2192
25	" "	67	11	78	56323 - 56355	68000 - 68044	2270
26	" "	98	9	107	56356 - 56407	68045 - 68099	2377
27	" "	75	12	87	56408 - 56452 57000 - 57042		2464
Totals		2093	367	2464[a]	1267	1197	

[a]Totals include fish released with incomplete information

Table 9. Numbers and tag identification of spiny dogfish released in the Qualicum Bay area, by set, June 1988.

Set no.	Release location	No. released			Tag no. range Mod. Petersen disc. DF.83--------	Cumulative release total
		M	F	T		
1	Qualicum Bay	26	16	42	56453 - 56494	42
2	" "	37	24	61	56495 - 56555	103
3	" "	18	11	29	56556 - 56584	132
4	" "	39	23	62	56585 - 56646	194
5	" "	32	8	40	56647 - 56686	234
6	" "	24	11	35	56687 - 56721	269
7	" "	8	7	15	56722 - 56736	284
8	" "	10	7	17	56737 - 56753	301
9	" "	16	22	38	56754 - 56791	339
10	" "	10	17	27	56792 - 56799 57600 - 57618	366
11	" "	10	11	21	57619 - 57639	387
12	" "	10	17	27	57640 - 57666	414
13	" "	6	7	13	56800 - 56812	427
14	" "	15	6	21	56813 - 56834	448
15	" "	23	8	31	56835 - 56865	479
16	" "	14	8	22	56866 - 56887	501
17	" "	7	3	10	56888 - 56897	511
18	" "	8	4	12	56898 - 56910	523
19	" "	15	16	31	56911 - 56942	554
20	" "	5	6	11	56943 - 56953	565
21	" "	12	9	21	56954 - 56974	586
22	" "	20	14	34	56794 - 56999 57043 - 57051	620
23	" "	27	15	42	57052 - 57094	662

Table 9 (cont'd)

Set no.	Release location	No. released			Tag no. range Mod. Petersen disc. DF.83--------	Cumulative release total
		M	F	T		
24	Qualicum Bay	9	8	17	57095 - 57112	679
25	" "	7	5	12	57113 - 57124	691
26	" "	6	3	9	57125 - 57133	700
27	" "	11	14	25	57134 - 57158	725
28	" "	5	11	16	57159 - 57174	741
29	" "	3	14	17	57175 - 57191	758
30	" "	5	22	27	57192 - 57218	785
31	" "	12	14	26	57219 - 57245	811
32	" "	12	13	25	57246 - 57270	836
33	" "	2	5	7	57271 - 57277	843
34	" "	2	4	6	57279 - 57284	849
35	" "	4	11	15	57285 - 57299	864
36	" "	10	6	16	57300 - 57315	880
Totals		480	400	880		

Table 10. Number and tag identification of spiny dogfish released off the southwest coast of Vancouver Island, by set, February 1987.

Set no.	Release location	No. released			Tag no. range DF.83--------	Cumulative release total
		M	F	T*		
1	48°27.9′ 125°30.5′	26	16	43*	37163 - 37206	43
2	48°30.6′ 125°23.8′	39	14	53	37207 - 37259	96
3	48°28.5′ 125°25.3′	79	56	135	37260 - 37375 37400 - 37419	231
4	48°30.1′ 125°23.9′	60	25	85	37376 - 37399 37420 - 37480	316
5	48°31.6′ 125°12522.3′	92	37	129	37481 - 37576 37600 - 37632	445
6	48°30.1′ 125°26.3′	2	9	11	37577 - 37587	456
7	48°30.0′ 125°32.0′	6	8	14	37588 - 37599 37634 - 37635	470
8	48°30.0′ 125°32.0′	0	1	1	37636	471
10	48°33.6′ 125°22.9′	18	13	31	37637 - 37668	502
12	48°30.1′ 125°24.1′	131	36	167	37669 - 37795 37800 - 37839	669
13	48°13.9′ 125°52.2′	140	43	183	37796 - 37799 37840 - 37979 38000 - 38039	852
14	49°01.2′ 125°20.2′	0	10	10	37980 - 37989	862
15	49°01.2′ 125°20.2′	2	11	13	37901 - 37999 38041 - 38043	875
16	49°01.2′ 125°20.2′	0	19	19	38044 - 38062	894
Totals		595	298	894*		

*Totals include fish released with incomplete data information

Table 11. Summary of pieces caught by longline during tagging cruises 1987 - 1988*.

	Southeast Queen Charlotte Sound January 1987	Campbell River May-June 1987	Campbell River May-June 1988	Qualicum Bay June 1988
Species				
Roundfish				
Giant Wrymouth	1	-	-	-
Lingcod	20	1	2	-
Midshipman	-		-	2
Pacific cod	44	14	12	1
Sablefish/Blackcod	-	-	1	-
Rockfish				
Sebastes caurinus	-	3	2	1
S. elongatus	2	-	-	-
S. maliger	-	37	15	-
S. ruberrimus	17	12	12	-
Flatfish				
Halibut	6	-	-	-
Selachii				
Spiny dogfish	3855	2987	2646	884
Ratfish	133	40	22	4
Skates	117	12	28	23
Soupfin shark	2	-	-	-
Invertebrates				
Anemones	-	-	-	1
Crab	-	-	-	
Coral	-	1	-	
Octopus	1	4	1	1
Starfish	1	13	41	133
Sea pen	-	2	-	1

*Detailed information by set available in Appendix tables 2 to 5.

Table 12. Summary of fish caught by trawl off southwest Vancouver Island, onboard the R/V W.E. RICKER, February 1987 (Tr = less than 1 kg).

Type	Weight (kg)	Pieces[1]	No. of hauls present.
ROUNDFISH			
Herring	5372	-	8
Sablefish/Blackcod	975	-	10
Hake	700	-	4
Chinook salmon	473	118	14
Pacific cod	215	-	12
Walleye pollock	110	-	8
Lingcod	39	8	7
Pacific tom cod	25	-	8
Pile perch	10	-	1
Shad	Tr	-	4
Sandfish	Tr	-	2
Anchovy	Tr	-	2
Shiner sea perch	Tr	-	2
Midshipman	Tr	-	2
Eel pouts	Tr	-	1
ROCKFISH			
Sebastes flavidus	56	-	7
S. paucispinis	15	-	2
S. pinniger	1	-	5
S. crameri	Tr	-	1
S. caurinus	Tr	-	1
FLATFISH			
Starry flounder	400	-	2
English sole	265	-	13
Rex sole	105	-	4
Dab (pacific)	83	-	9
Halibut	30	1	1
Turbot	11	-	2
Petrale sole	10	-	7
Rock sole	5	-	2
Slender sole	2	-	2
Curlfin sole	Tr	-	1
Dover sole	Tr	-	1
SELACHII			
Spiny dogfish	2778	905	16
Longnose skate	365	-	10
Big skate	50	-	1
Black skate	15	-	4
Ratfish	170	-	6
INVERTEBATES			
Squid	Tr	-	1
Pink shrimp	Tr	-	1

[1]Records of pieces maintained for selected species

Table 13. List of common and scientific names of fishes captured during spiny dogfish tagging cruises conducted during 1987 and 1988.

Common Names	Scientific Names
FLATFISH	
Arrowtooth flounder (turbot)	*Atheresthes stomias*
Curlfin sole	*Pleuronichthys decurrens*
Dover Sole	*Microstonmus pacificus*
English Sole	*Parophrys vetulus*
Pacific halibut	*Hippoglossus stenolepis*
Pacific sanddab	*Citharichthys sordidus*
Petrale sole	*Eopsetta jordani*
Rex sole	*Glyptocephalus zachirus*
Rock sole	*Lepidopsetta bilineata*
Slender sole	*Lyopsetta exilis*
Starry flounder	*Platichthys stellatus*
ROUNDFISH	
Anchovy	*Engraulis mordax mordax*
Eelpouts	Zoarcidae
Chinook salmon	*Oncorhynchus tshawytscha*
Coho salmon	*O. kisutch*
Midshipman	*Porichthys notatus*
Pacific hake	*Merluccius productus*
Pacific herring	*Clupea harengus pallasi*
Lingcod	*Ophiodon elongatus*
Pacific cod	*Gadus macrocephalus*
Pacific tomcod	*Microgadus proximus*
Sablefish/Blackcod	*Anoplopoma fimbria*
American Shad	*Alosa sapidissima*
Pile perch	*Rhacochilus vacca*
Shiner sea perch	*Cymatogaster aggregata*
Walleye pollock	*Theragra chalcogramma*
Giant wrymouth	*Delolepis gigantea*
SELACHII	
Ratfish	*Hydrolagus colliei*
Skate	Rajidae
Big skate	*Raja binoinoculata*
Black skate	*R. kincaidi*
Longnose skate	*R. rhina*
Soupfin shark	*Galeorhinus zyopterus*
Spiny dogfish	*Squalus acanthias*
ROCKFISH	
Boccacio	*Sebastes paucispinis*
Canary rockfish	*S. pinniger*
Copper rockfish	*S. caurinus*
Dark blotched rockfish	*S. crameri*
Green stripe rockfish	*S. elongatus*
Quillback rockfish	*S. maliger*
Yelloweye rockfish	*S. ruberrimus*
Yellowtail rockfish	*S. flavidus*

Table 14. Summary length frequency of tagged spiny dogfish, by release cruise, and sex during 1987 and 1988.

Total length (cm)	Southeast Queen Charlotte Sound January 1987			Southwest Vancouver Island February 1987		
	M	F	T	M	F	T
51	-	1	1	-	-	-
52	-	0	0	-	-	-
53	1	0	1	-	1	1
54	1	0	1	-	0	0
55	1	0	1	1	2	3
56	0	1	1	0	0	0
57	0	1	1	4	4	8
58	4	4	8	4	2	6
59	0	5	5	4	8	12
60	0	2	2	5	7	12
61	0	5	5	4	5	9
62	1	1	3	5	9	14
63	1	4	2	7	7	14
64	1	2	3	9	11	20
65	1	1	0	10	14	24
66	1	2	3	2	8	10
67	0	0	0	10	10	20
68	2	1	3	4	13	17
69	2	5	7	4	1	5
70	1	6	7	3	10	13
71	4	1	5	9	1	10
72	4	4	8	4	5	9
73	10	5	15	5	6	11
74	14	5	19	4	4	8
75	20	7	27	3	2	5
76	22	2	24	12	1	13
77	28	4	28	8	1	9
78	42	4	46	14	4	18
79	56	10	66	25	3	28
80	58	6	64	26	2	28
81	91	9	100	36	1	37
82	96	9	105	41	4	45
83	88	12	100	34	2	36
84	117	16	133	35	2	37
85	124	24	149	55	1	56
86	122	21	143	49	3	52
87	104	27	131	52	2	54
88	84	25	109	33	0	33
89	85	29	115	25	2	27

Table 14 (cont'd)

Total length (cm)	Southeast Queen Charlotte Sound January 1987			Southwest Vancouver Island February 1987		
	M	F	T	M	F	T
90	67	51	118	16	0	16
91	46	59	105	12	2	14
92	32	54	86	10	4	14
93	21	70	91	3	3	6
94	13	75	88	3	1	4
95	4	83	87	1	4	5
96	4	80	84	1	4	7
97	3	87	90		8	9
98	2	118	120		6	6
99	1	113	114		6	6
100	1	148	149		6	6
101	0	122	122		11	11
102	0	120	120		9	9
103	0	128	128		20	20
104	1	98	99		7	7
105	1	98	99		9	9
106		94	94		9	9
107		80	80		5	5
108		53	53		4	4
109		62	62		4	4
110		49	49		2	2
111		42	42		4	4
112		24	24		3	3
113		18	18		3	3
114		12	12		2	2
115		17	17		2	2
116		6	6		1	1
117		8	8		0	0
118		6	6		0	0
119		1	1		1	1
120		5	5			
121		2	2			
122		0	0			
123		3	3			
124		1	1			
125		1	1			
Total[a]	1382	2249	3636	595	298	894

Table 14 (cont'd)

Total length (cm)	Campbell River May-June 1987			Campbell River May-June 1988			Qualicum Bay June 1988		
	M	F	T	M	F	T	M	F	T
42				1	1	2			
43				0	0	0			
44	1	-	1	0	0	0			
45	0	-	0	0	0	0			
46	1	2	3	0	0	0			
47	1	3	4	0	1	1			
48	2	3	5	1	0	1			
49	3	3	6	1	0	1	2	1	3
50	2	8	10	3	1	4	1	0	1
51	3	9	12	2	2	4	1	1	2
52	4	13	17	6	0	6	1	0	1
53	9	14	23	7	0	7	1	1	1
54	9	6	15	8	6	14	0	0	0
55	13	10	23	5	5	10	1	1	2
56	12	12	24	7	4	11	1	1	2
57	7	15	22	6	5	11	1	1	2
58	18	15	33	3	3	6	2	3	5
59	14	16	31	7	3	10	3	0	3
60	11	17	28	8	5	13	1	0	1
61	11	13	25	10	4	14	2	3	5
62	11	13	25	18	9	27	1	1	2
63	21	18	40	13	6	19	1	10	11
64	15	13	29	18	3	21	8	4	12
65	22	16	40	11	8	19	3	15	18
66	27	19	47	15	7	22	6	9	15
67	20	13	34	16	4	20	13	16	29
68	30	20	50	18	2	20	3	12	15
69	22	14	36	25	3	28	13	12	25
70	37	11	52	25	8	33	18	11	29
71	43	10	55	31	5	36	16	9	25
72	46	8	1	49	4	53	18	18	36
73	67	9	77	47	7	54	28	10	38
74	64	12	77	43	6	50	42	10	52
75	96	7	109	73	4	77	20	10	30
76	96	7	105	93	2	95	24	12	36
77	120	6	126	101	6	107	24	10	34
78	139	11	152	120	1	121	31	10	41
79	146	9	155	117	4	121	25	9	34

Table 14 (cont'd)

Total length (cm)	Campbell River May-June 1987 M	F	T	Campbell River May-June 1988 M	F	T	Qualicum Bay June 1988 M	F	T
80	151	4	155	136	4	140	35	11	46
81	128	6	134	133	7	140	14	5	19
82	126	8	137	136	6	142	24	10	34
83	130	8	138	152	5	157	24	8	32
84	107	5	113	115	1	116	14	9	23
85	84	7	91	114	6	120	13	12	25
86	81	5	86	91	1	92	12	8	20
87	72	4	77	85	4	89	4	12	16
88	59	5	64	61	7	68	5	3	8
89	45	4	50	61	4	65	9	8	17
90	36	3	39	31	3	34	1	9	10
91	15	6	21	23	4	27	1	8	9
92	11	6	16	14	3	17	5	6	11
93	12	4	16	11	7	18	2	6	8
94	5	7	12	8	5	13	2	7	9
95	6	7	13	10	9	19	2	5	7
96	1	8	9	1	7	8	1	8	9
97	3	10	13	2	12	14	0	9	9
98	5	8	8	0	7	7	0	6	6
99		7	7	1	6	7	1	5	6
100		13	13		13	13		7	7
101		6	6		15	15		2	2
102		8	8		16	16		4	4
103		6	6		14	14		4	4
104		6	6		9	9		1	1
105		8	8		14	14		7	7
106		8	8		3	3		5	5
107		7	7		8	8		2	2
108		7	7		9	9		4	4
109		4	4		6	6		2	2
110		6	6		4	4		1	1
111		3	3		3	3		2	2
112		3	3		3	3		1	1
113		0	0		3	3		0	0
114		0	0		1	1		1	1
115		3	3		3	3		1	1
116		0	0		2	2		0	0
117		1	1		2	2		0	0
118					1	1		0	0
119					0	0		1	1
120					0	0			
121					1	1			
122									
123									
124									
125									
Total	2213	591	2842	2093	367	2464	480	400	880

[a]Totals include fish released with incomplete information

Table 15. Recovery area of tagged spiny dogfish by release area, 1978 - 1989.

	RELEASE AREA					
	Strait of Georgia					
	North	Central	South	Southwest coast of Vancouver Island	North coast of British Columbia	Total
No. released	29,789	11,616	9,169	9,915	9,377	69,866
Recovery area	Numbers recovered					
Japan	-	-	-	4	8	12
Alaska	-	1	-	1	1	3
West coast Queen Charlotte Island	-	0	-	-	1	1
Hecate Strait	4	1		3	39	47
Queen Charlotte Sound	9	2	4	-	14	29
Johnstone Strait	25	0	2	-	1	28
Strait of Georgia						
North	395	46	12	-	3	456
Central	171	255	44	-	1	471
South	121	175	399	18	5	718
Unknown	34	58	39	1	3	135
Puget Sound	8	9	15	7	2	41
Juan de Fuca Strait	7	14	26	9	3	59
West coast of Vancouver Isl.	12	12	24	100	30	178
Unknown Canadian	47	63	59	30	18	217
Outer coast						
Washington	4	7	18	15	4	48
Oregon	-	-	1	8	2	11
California	-	-	-	4	1	5
Mexico	-	-	-	1		1
Unknown	33	36	40	37	15	161
Total	870	679	683	238	151	2621
% recovered to December 31, 1989	2.9%	5.8%	7.5%	2.4%	1.6%	3.8%

Table 16. Annual recoveries of tagged spiny dogfish by area and year.

Strait of Georgia

Yr. released	1978	1979	1980	1981	1982	1983	1984	1985	1987	1988	Total
No. released	1,918	4,501	7,475	6,970	6,970	1,613	7,296	4,113	4,113	3,344	50,574

Yr. recovered	Numbers recovered										Totals
1978	15										15
1979	15	32									47
1980	10	71	62								143
1981	4	39	58	24							125
1982	4	31	78	106	89						308
1983	4	43	70	95	121	12					345
1984	0	29	62	61	113	16	76				357
1985	1	11	27	30	67	8	61	12			217
1986	0	14	24	28	36	9	57	42			210
1987	0	18	19	29	61	4	50	19	10		210
1988	1	6	26	24	37	6	41	13	11	12	177
1989	1	5	12	7	14	1	11	3	2	22	78
Totals	55	299	438	404	538	56	296	89	23	34	2232
% recovered to December 31, 1989	2.9%	6.6%	5.9%	5.8%	5.1%	3.5%	4.1%	2.2%	0.8%	1.0%	4.4%

Table 16 (cont'd). Annual recoveries of tagged spiny dogfish from releases off southwest Vancouver Island and north coast[a] of British Columbia.

	Southwest Vancouver Island				North coast of British Columbia			
Year released	1984	1985	1987	Total	1980	1982	1987	Total
No. released	1,978	7,043	894	9,915	1,064	4,677	3,636	9,377
Year recovered	Number recovered			Total	Number recovered			Totals
1980					1			1
1981					4			4
1982					8	8		16
1983					3	9		12
1984	3			3	3	11		14
1985	13	30		43	2	17		19
1986	17	34		51	1	18		19
1987	13	32	6	51	3	17	4	24
1988	13	50	7	70	2	14	19	35
1989	6	11	3	20	0	5	2	7
Totals	65	157	16	238	27	99	25	151
% recovered to December 31, 1989	3.3%	2.2%	1.8%	2.4%	2.5%	2.1%	0.7%	1.6%

[a]Includes Dixon Entrance, Hecate Strait and Queen Charlotte Sound.

Table 17. Summary of recovery method of tagged spiny dogfish by release area, 1978 - 1989.

	Release Area					
	Strait of Georgia			Southwest coast of Vancouver Island	North coast of British Columbia	
Recovery method	North	Central	South	No. of recoveries		Total
Line						
Dogfish	213	174	139	36	43	605
Prawn bait	9	6	2	0	0	17
Halibut	1	1	0	2	8	12
Hand	33	7	3	2	0	45
Salmon troll	9	4	7	3	0	23
Sport bait	28	4	9	1	0	42
Sport troll	142	70	76	9	1	298
Unknown	7	4	2	0	0	13
Trawl						
Fish bottom	250	214	187	73	49	773
Shrimp bottom	0	2	7	3	2	14
Hake midwater	6	6	17	15	1	45
Nets						
Sunken gillnet	10	40	32	8	4	94
Salmon gillnet	57	37	58	8	7	167
Salmon seine	7	2	4	0	0	13
Herring seine	0	2	0	0	0	2
Trap						
Blackcod	1	0	0	0	2	3
Crab	3	1	2	0	0	6
Unknown	94	105	138	78	34	449
Total	870	679	683	238	151	2621

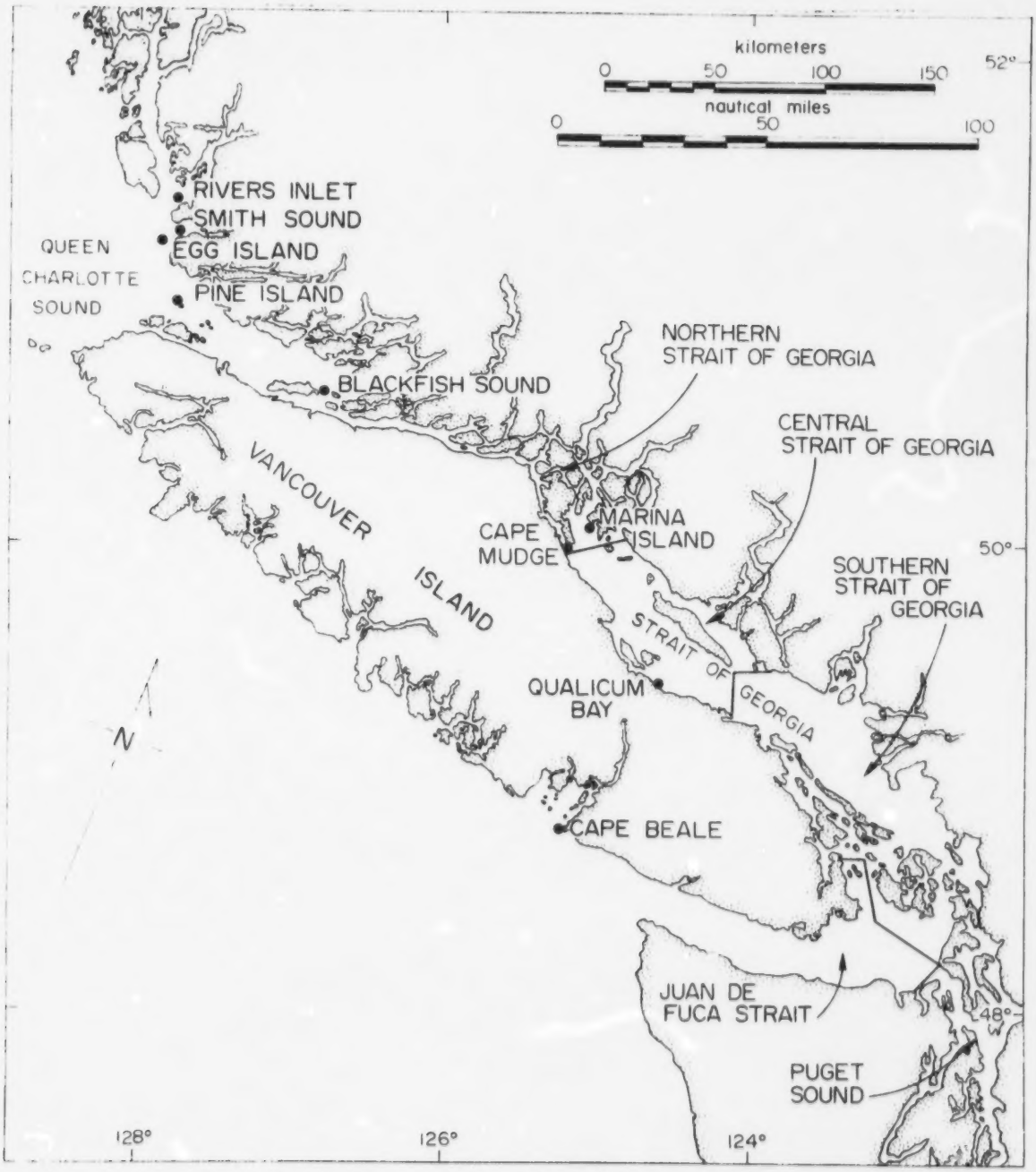

Fig. 1. Location of reference points of dogfish tag releases off British Columbia waters during 1988 and 1989.